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(54) **Apparatus for making, starting from a continuous film, coffee wafers, for espresso-coffee machines**

(57) The apparatus comprises means for driving plates (2) along an advancing path, each of which is provided, on a top face thereof, with a plurality of recesses (3). Along the advancing path is arranged a first delivery station (10) for delivering a first permeable film strip (12), having a width adapted to substantially cover all of the recesses of each plate and cutting means (13) for cutting into strips said film in a longitudinal direction thereof, as well as means for cross-cutting the cut strips. Moreover, in the first station, a coffee dose (15) is delivered at each recess, on the top of the film previously deposited on the plates. Downstream of the first station is provided

a second pressing station (21) for pressing the coffee doses supplied on the plates and a third delivery station (23) for delivery a second permeable film (25) web on the top of the pressed coffee doses. In the third station are provided cutting means for cutting the second film web into longitudinal strips as well as means for cutting in a cross direction the cut strips. In the third station are moreover provided sealing means for sealing to one another the two films, in order to fit therebetween the pressed coffee doses. In a fourth station (27), the sealed films are cut about the embedded coffee doses, for finishing the thus formed wafer elements.

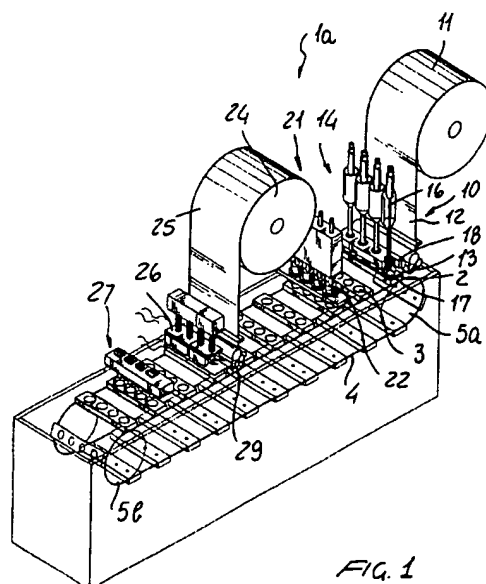


FIG. 1

## Descripti n

### BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for making, from a continuous film material, coffee wafer elements, either of round or not round shape, for automatic espresso- coffee machines.

Apparatus for making, from a continuous film, round coffee wafers, for automatic espresso coffee making machines are already known.

These apparatus are mainly constituted by a chain supporting a plurality of plates which are evenly spaced from one another along said chain and are each provided, on a top face thereof, with a recess.

Along the path followed by the chain, is generally arranged a first station, in which a permeable film length is deposited on the top of each plate, so as to cover a related recess.

In the first station is provided a metering device which delivers, on the top of the permeable film length, at the recess respectively arranged in the first station, a set ground coffee dose.

Along the path followed by the chain are provided further processing stations, i.e.: a pressing station for pressing the delivered coffee dose, a covering station in which the supplied coffee dose is covered by a second length or portion of permeable film and in which the two film lengths are sealed to one another so as to embed therein the coffee dose, as well as an end station, in which the thus sealed film lengths are cut about the embedded coffee dose so as to provide round coffee wafers or discs.

The above mentioned apparatus for making coffee wafers, however, are affected by several drawbacks.

In fact, since each plate, coupled to the chain for driving the plate through the processing stations, is provided with a single dose receiving recess, it is necessary to use permeable film rolls of a comparatively small width, which are quickly exhausted so as to require frequently replacing operations, with a consequent very low yield of the overall machine or apparatus.

This will consequently increase the cost of the produced coffee wafer or disc elements.

Moreover, the above mentioned prior apparatus have a comparatively large size, with a consequent problem of properly arranging the apparatus in a production shop.

### SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to overcome the above mentioned problems, by providing a coffee wafer making apparatus which, the operating speed thereof being the same, will allow to obtain an increased making yield, with respect to prior like apparatus.

Within the scope of the above mentioned aim, a

main object of the present invention is to provide such an apparatus which, the product yield being the same, will require a number of permeable film replacing operations much less than that of prior apparatus.

Another object of the present invention is to provide such a coffee wafer making apparatus which has a size much smaller than that of prior apparatus.

Yet another object of the present invention is to provide such a coffee wafer making apparatus in which the metering of the supplied coffee can be precisely controlled and adjusted.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent herein-after, are achieved by an apparatus for making, from a continuous film, coffee wafers, either of round shape or not, for automatic espresso coffee machines, characterized in that said apparatus comprises driving means for driving a plurality of plates along an advancing path therefor.

Each of the mentioned plates is provided, on a top surface thereof, with a plurality of coffee dose receiving recesses, which are arranged transversely of the plate advancing direction.

Along the plate advancing direction is provided a first delivery station for delivering a first permeable film web, said web having a width adapted to substantially cover all of the recesses of each plate; at said first station being provided cutting means for cutting said film into strips in a longitudinal direction thereof as well as further cutting means for cutting said film strips in the cross direction thereof; in said first station being moreover provided coffee dose delivering means for delivering or supplying a coffee dose into each of said recesses on the top of said film deposited on said plate.

Downstream of the first station are moreover provided: a second end pressing station for pressing the coffee doses delivered on said plates, a third delivery station for delivering a second permeable film web on the top of said pressed coffee doses.

Said first station is provided with cutting means for cutting the second film web into longitudinal strips as well as with further cutting means for transversely cutting said film strips in a cross direction, as well as with sealing means for sealing the two films to one another to embed therein the pressed coffee doses, as well as a fourth station for cutting the sealed films about said coffee doses embedded between said films, in order to provide finished coffee wafers.

### BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the apparatus according to the present invention will become more apparent hereinafter from the following detailed disclosure of two preferred, though not exclusive, embodiments of said apparatus which are illustrated, by way of an indicative, but not limitative, example, in the

figures of the accompanying drawings, where:

Figure 1 is a perspective view illustrating a first embodiment of the apparatus according to the present invention;

Figure 2 is a further perspective view illustrating a variation of the coffee dose delivering means provided in the first processing station of the subject apparatus;

Figure 3 is a schematic view illustrating the several operating steps of the subject apparatus;

Figure 4 is a further perspective view illustrating a second embodiment of the subject apparatus; and  
Figure 5 illustrates a detail of the apparatus shown in figure 4.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the number references of the above mentioned drawing figures, the coffee wafer making apparatus, according to the present invention, which has been generally indicated, in the two embodiments thereof, by the reference number 1a and 1b, comprises driving means for driving a plurality of plates 2 along a plate advancement path which, in the first embodiment, is rectilinear and, in the second embodiment of the apparatus, is a circular path.

The plates 2 of the two embodiments are provided, on the top surface thereof, with a plurality of coffee dose receiving recesses 3 which adjoin one another in a cross direction of the plates 2, i.e. a direction transversal of the plate 2 advancing direction.

In the first embodiment, the driving means for driving said plates 2 substantially comprise a chain 4 entrained on a pair of rollers or pinions 5a and 5b having horizontal parallel axes.

At least one of said rollers or pinions 5a and 5b is driven, by an intermittent rotary movement, about the related axis, so as to cause said plates 2 to progressively intermittently advance in order to arrange successively said plates in the several processing stations of the apparatus.

As shown, the plates 2 are coupled to the chain 4 and are evenly spaced from one another.

In the second embodiment, the driving means comprise a table 6 which can be controllably turned about a vertical axis 7. The plates 2 are made as spokes of said table 6, and are radially arranged about the axis 7 and angularly evenly spaced from one another about said axis 7.

The table 6 can be rotatively driven, in an intermittent manner, about said axis 7 so as to cause said plates 2 to be arranged in the several apparatus processing stations, said stations being distributed along the circular path followed by the plates 2 as the table 6 is turned.

More specifically, the processing or operating stations of the subject apparatus comprise a first station

10, in which is supported a roll 11 of a first permeable film web 12, the width of which is so designed as to substantially cover all of the coffee dose receiving recesses 3 of each plate 2.

In the first station 10 are moreover provided cutting means for cutting said film 12 into film strips in a longitudinal direction of said film. The width of each film strip is adapted to fully cover a coffee dose receiving recess 3. The cutting means for cutting said film into film strips, longitudinally of said film, comprise any types of known cutting means which, for simplicity, have not been specifically shown.

In the first station 10 is moreover provided a blade 13 operating for cutting said film strips in a cross direction, after having deposited said film strips on the top surface of the plate 2 arranged in said first station 10.

The first station 10 comprises moreover delivery means 14 for delivering a coffee dose 15 into each of said recesses 3, on the top of the film 12.

As shown in figure 1, the coffee dose delivering means 14 can comprise either one or more screw dosing devices 16 provided for depositing a set coffee dose directly on the film 12 and which, by means of a pad 17 rotating about the axis of the screw, will distribute and pre-press the coffee.

Then, on the pre-pressed coffee dose a covering element 18 is engaged and then a pad, arranged inside said covering element, and suitably contoured and turned, will further press to an end condition said coffee dose.

As is clearly shown in figure 2, the coffee dose delivering means, which have been herein indicated by the reference number 14a, can also be formed by one or more screw metering devices 19, provided for depositing a set coffee amount into one or more cylindrical vessels 20 (barrels), brought into contact with the film 12.

Then, a pad, arranged near the respective barrel, and of suitable shape and suitably turned about a vertical axis, will be lowered to press the coffee.

The coffee dose delivering means can also be constituted by weighing means, of any known types which, for simplicity, have not been specifically illustrated.

Downstream of the first station 14, 14a is arranged a second station 21, in which, by means of vertically movable pads 22 the coffee doses deposited on the film 12 at the recesses 3, are suitably pressed.

After the second station 21, or downstream therefrom, is arranged a third station 23, in which is supported a second roll 24 for supporting a second permeable film 25, which will be deposited on the pressed coffee doses.

In the first station 23 are moreover provided, likewise the first station 10, cutting means for cutting the second film 25 into longitudinal strips as well as a cutting blade 29 provided for cross cutting the longitudinally cut film strips.

The first station 23 comprises moreover sealing means 26, of any known types, for sealing the two films 12 and 25 so as to embed therein the pressed coffee

doses.

Downstream of the first station 23 is provided a fourth station 27 in which are arranged cutting means for cutting the films 12 and 25 at the region thereof sealed about the coffee doses, and so that as to provide finished coffee wafers.

At the output of the apparatus is provided a weighing device 30 for weighing the coffee wafers, said weighing device 30 being coupled to the coffee dose delivering means of the first station 10 so as to adjust in a feedback like manner, the supplied coffee dose.

Thus, since the apparatus according to the present invention can use permeable film rolls having a width which is much greater than that of the film rollers used in prior apparatus, it will be possible to obtain a very increased yield, the driving speed of the several station elements being the same, than that of the prior apparatus or, the yield being the same, it will be possible to greatly reduce the film roller replacement operations.

Since each plate is provided with a plurality of adjoining coffee dose receiving recesses, in addition to using greater width film rolls, it will be also possible to provide an apparatus which, the yield being the same, will have a very reduced size, thereby said apparatus can be easily fitted in small space making shops.

From the above disclosure and from an observation of the several figures of the accompanying drawings, it should be apparent that the subject apparatus fully achieves the intended aim and objects.

Moreover, owing to the feedback control and adjustment of the supplied coffee doses, the coffee can be metered in a highly precise manner.

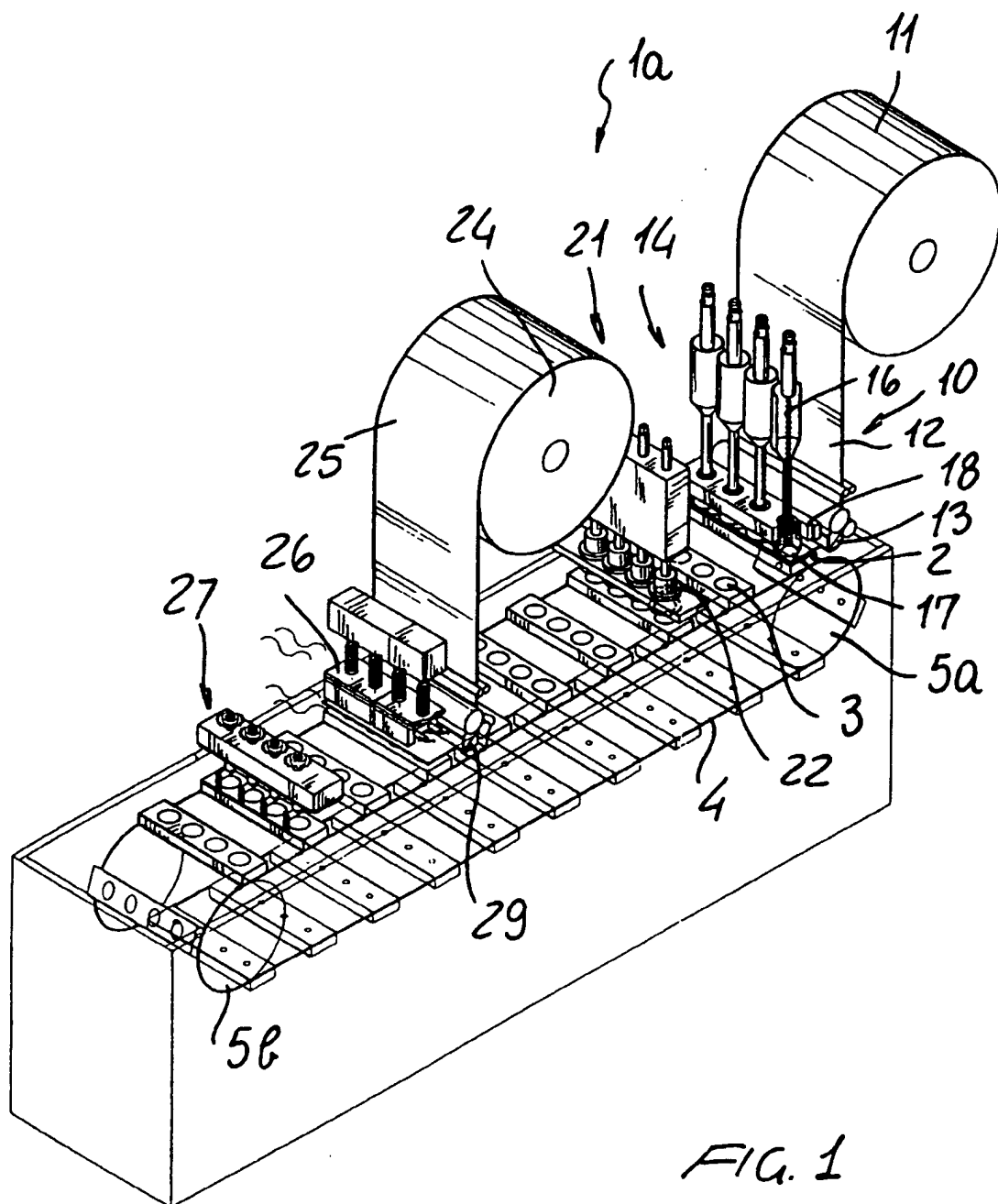
While the apparatus has been disclosed with reference to preferred embodiments thereof, it should be apparent that the disclosed embodiments are susceptible to many modifications and variations all of which will come within the scope and spirit of the appended claims.

#### Claims

1. An apparatus for making, from a continuous film, coffee wafers, either of round or of not round shape, for espresso coffee automatic making machine, characterized in that said apparatus comprises driving means for driving a plurality of plates along an advancing path therefor; each of said plates being provided, on a top surface thereof, with a plurality of coffee dose receiving recesses, arranged transversely of the advancing direction of said plates; along the plate advancing path being arranged a first delivery station for delivering a first permeable film web, said web having a width adapted to substantially cover all of the recesses of each said plate; at said first station being provided film cutting means for cutting said film into strips in a longitudinal direction thereof and further cutting means for cutting said film strips in a cross direction thereof;

in said first station being moreover provided delivering means for delivering a coffee dose into each of said recesses, on the top of said film deposited on said plates; downstream of the first station being provided a second station for pressing the coffee doses supplied on said plates, a third station for supplying a second permeable film web, on the top of said pressed coffee doses, a first station including cutting means for cutting said second film web into longitudinal strips and further cutting means for transversely cutting said longitudinal strips, as well as sealing means for sealing to one another said films, to embed the pressed coffee doses therein, and a fourth station for cutting the films sealed about said pressed coffee doses, to provide finished coffee wafers.

2. An apparatus according to Claim 1, characterized in that at an outlet of said path is provided a weighing device for weighing said coffee wafers, said weighing device being coupled to said coffee dose delivery means, in order to feed back adjust the delivered coffee amount.
3. An apparatus according to Claim 1, characterized in that said path is a substantially rectilinear path and that said driving means comprise a linear chain supporting a plurality of said plates evenly spaced from one another.
4. An apparatus according to Claim 1, characterized in that said path is a substantially circular path and that said driving means comprises a rotary table turning about a vertical axis, with an intermitted motion, and bearing said plates as radially arranged about said axis and evenly angularly spaced from one another about said axis.
5. An apparatus according to Claim 1, characterized in that said coffee dose delivery means comprise screw metering devices each of which is provided with a pressing element for pressing the delivered coffee doses.
6. An apparatus according to Claim 1, characterized in that said coffee dose delivery means comprise a weighing device for weighing the delivered coffee amount.



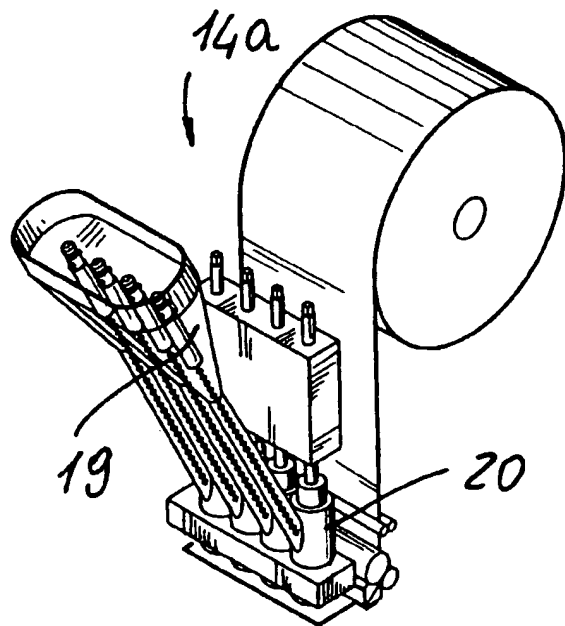


FIG. 2

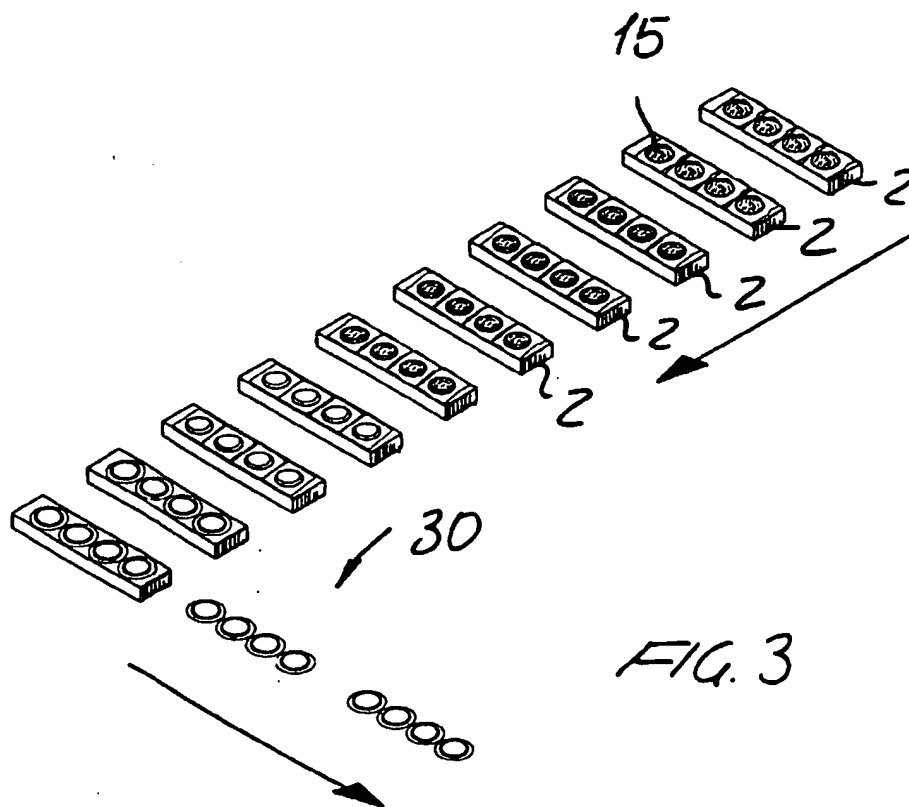
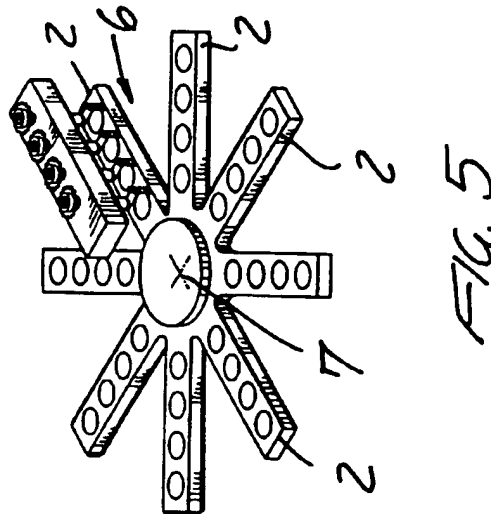
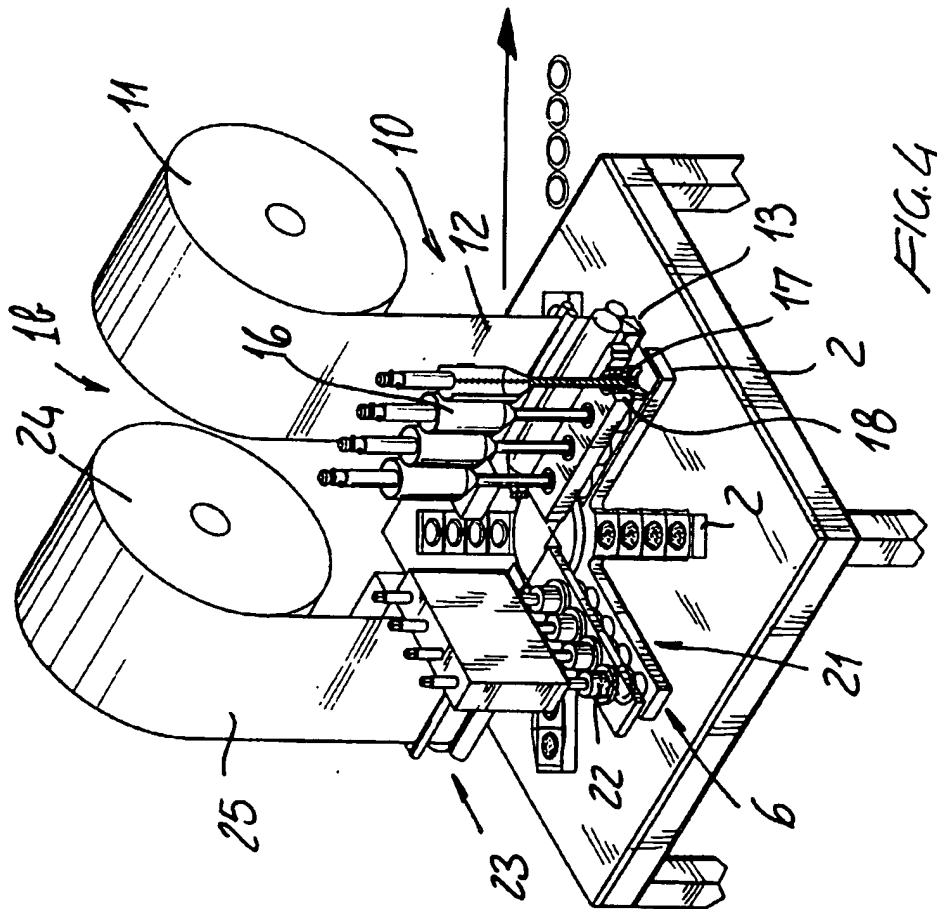


FIG. 3





European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 96 83 0548

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US 4 359 072 A (GENERAL FOODS CORPORATION) * abstract; figures 1-6 *	1	B65B9/02
A	US 4 747 250 A (ROSSI) * abstract; figures 1-3 *	1-3,5,6	
A	US 4 571 924 A (THE PROCTOR & GAMBLE COMPANY) * abstract; figure 2 *	1	
A	DE 31 29 424 A (HASSIA VERPACKUNG) * abstract; figure 1 *	1	
A	US 3 736 722 A (NEW JERSEY MACHINE CORPORATION) * abstract; figures 1,2 *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 March 1997	Examiner Lenoir, C
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